STATE REGULATION OF UNDERWATER NOISE

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ABSTRACT

The California Coastal Commission (CCC) is the designated coastal management agency administering the federal Coastal Zone Management Act (CZMA) over Pacific Ocean waters offshore of California (outside of San Francisco Bay). Once a state's coastal management program is certified by the federal government, the CZMA gives state coastal management agencies regulatory control (federal consistency review authority) over all federal activities and federally licensed, permitted or funded activities affecting the coastal zone (regardless of whether they occur within, landward or seaward of the coastal zone boundary), if the activity affects the land or water uses or natural resources of the coastal zone. The regulations and the regulatory processes in California under state law and under the federal CZMA will be discussed with respect to underwater acoustic activities. Policy evolution over the past two decades will also be examined, as well as comparisons and contrasts with procedural and policy positions taken by other states.

I. Overview

A number of states have historically used their state law authorities to minimize or mediate conflicts between existing economically important industries (e.g., conflicts between oil and gas operations and commercial fishing activities) in state waters, or to protect especially biologically important resources. The passage of the federal Coastal Zone Management Act (CZMA) in 1972 expanded the reach of states to activities occurring outside their waters, and relatively recent concerns over the effects of anthropogenic noise in the ocean has increased a number of states' interest in protecting marine mammals and other marine species. This paper will summarize the state and federal law processes, provide case histories exemplifying the use of these processes, and look at policy evolution concerning acoustic issues over the past two decades.

II. The Regulatory Processes

States generally have up to three regulatory avenues to regulate underwater noise within or affecting state waters and resources: (1) state permit authority; (2) state ownership responsibilities (leasing/permitting for tide and submerged lands); and (3) federal consistency authority under the CZMA.

A. State Law. Activities within state territorial waters normally fall within two of these categories:

(1) As the underlying owner of tide and submerged lands, usually out to three miles, the states have the authority to issue leases or permits for activities within or over submerged lands (in California such authority rests within the California State Lands Commission (CSLC)). The State holds these "sovereign lands," which include tide and submerged lands adjacent to the entire coast and offshore islands of the State, from the mean high tide line to three nautical miles offshore, in the "public trust." This limits uses that can be allowed to "public purposes consistent with provisions of the Public Trust such as fishing, water dependent commerce and navigation, ecological preservation and scientific study" (see Division 6 of the California Public Resources Code (PRC)).

(2) Many states have separate permit jurisdiction as well over any activities within state waters (in California this authority rests with the California Coastal Commission (CCC), which regulates such uses under its coastal development permitting authority). The CCC was established in 1972 as a citizen initiative ("Proposition 20"), and the CCC began issuing coastal development permits under state law in 1973. This regulatory authority was extended in 1976, when the legislature passed the Coastal Act of 1976 (see Division 20 of the California PRC).

B. Federal Law. The CZMA is administered at the federal level within the National Oceanic and Atmospheric Administration's (NOAA's) Office of Ocean and Coastal Resource Management (OCRM). The CZMA created a unique state-federal partnership, which leaves day-to-day management decisions at the state level in the 33 states and territories with federally approved Coastal Zone Management (CZM) programs. Since 1974, with the approval of the first state CZM program in Washington, a total of 28 coastal states and five island territories have developed CZM programs. Together, these programs protect more than 99 percent of the nation's 95,331 miles of oceanic and Great Lakes coastline.

While the federal consistency *procedures* are more or less consistent from state to state (based on the federal consistency regulations[1]), each state has a separate certified CZM program[2]. Few (if any) states have specific policies addressing underwater acoustics; policy decisions are usually based on broader resource protection policies.

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[1] 15 CFR Part 930

[2] The certified state programs can be viewed at OCRM's website: http://www.ocrm.nos.noaa.gov/czm/czmsitelist.html

Historically under state law, federal agency projects and activities outside state waters (e.g., beyond the 3 mile limit) were not subject to state regulation. However, the CZMA enacted a new regulatory regime, a combined federal/state partnership for managing coastal resources. One of the most significant consequences of this partnership was that, for the first time, it subjected federal agency activities to state review, once a state's coastal zone management program became certified by the federal government. One of the "carrots" of this program, aside from funding for comprehensive coastal planning, was that upon certification of a state's coastal management program (CMP), a federal agency must conduct its activities affecting any state's coastal zone (including federal projects, federal permits and licenses, and federal assistance to state and local governments) in a manner consistent with the state's certified program.

The tests and procedures differ somewhat for federal projects and federally authorized or funded projects. The processes established to implement this requirement is called a consistency *determination* for federal activities and a consistency *certification* for federal permits and licenses and federal support to state and local agencies. Federal agency activities, subject to the consistency determination process, must be "consistent to the maximum extent practicable" with the state's CMP, which, by definition (15 CFR Section 930.32) means that they must be "fully consistent with such programs unless compliance is prohibited based upon the requirements of existing law applicable to the Federal agency's operations."

In addition, and exemplifying the "partnership" aspect of federal consistency, an objection by a state is not the same as a veto. Federal agencies can proceed in the face of a state's objection; the CZMA rules require their activities to be "consistent to the maximum extent practicable," but do not specify that *either* the state or the federal government has the "final say." In the event of a dispute, parties are expected and encouraged to cooperate and negotiate, and in the event this is unsuccessful, formal and informal mediation services are available from the Secretary of Commerce or its designee. If conflicts cannot be resolved, either side can attempt redress through litigation. In practice, the process has been remarkably effective. There have been relatively few objections by states to federal activities (most conflicts have been resolved through negotiation), as well as little litigation, erasing some fears when the program was enacted that it would result in regulatory gridlock.[3]

On the other hand, for federally permitted and supported activities, a consistency *certification* is required from the project proponent. These activities must be *fully* consistent with the state's CMP. State agency objections to consistency certifications are appealable to the Secretary of Commerce and can be overridden by the Secretary. Unless the Secretary overrides the state's objection, the federal permitting or assisting agency is prohibited from authorizing the activity.

[3] For an interesting examination of the balance of power between state and federal interests through the federal consistency process, see Coastal Management: 29:341-352, 2001*: Judicial Interpretations of Federal Consistency under the Coastal Zone Management Act,* Braxton C. Davis, U. Rhode Island.

The trigger for federal consistency reviews is not based on the location of the activity, but whether the activity affects lands or water uses or natural resources of the state's coastal zone. The preamble to the federal consistency regulations, citing Congressional intent (a U.S. House of Representatives Conference Report), notes that "The focus of the Federal agency's evaluation should be on coastal effects, not on the nature of the activity. The Conference Report provides further clarification on the scope of the effects test:

> *The question of whether a specific federal agency activity may affect any natural resource, land use, or water use in the coastal zone is determined by the federal agency. The conferees intend this determination to include effects in the coastal zone which the federal agency may reasonably anticipate as a result of its action, including cumulative and secondary effects. Therefore, the term ``affecting'' is to be construed broadly, including direct effects which are caused by the activity and occur at the same time and place, and indirect effects which may be caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.*

C. <u>Illustrative Example</u>. A useful illustration showing the various applicable state and federal procedures is the Scripps California "ATOC"[4] [5] project, which included a sound source 48 nautical miles offshore, with a power cable to shore connecting with an on-land power source (on federally-owned property). The following procedures came into play, starting from the most landward point and working seaward (see map illustrating the applicable boundaries and the ATOC cable):

1. Because the entire project was federally funded (by the federal Advanced Research Projects Agency), and because Scripps, as part of the University of California, San Diego, is a unit of State government, the project needed a consistency certification as it constituted "federal assistance to state or local government"[6].

2. Placing and burying the cable on federal government (U.S. Air Force) property needed a consistency certification from the CCC, as a federally-permitted (i.e., Air Force-permitted) activity.

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[4] Scripps Institution of Oceanography, Acoustic Thermometry of Ocean Climate (ATOC) Project and Marine Mammal Research Program (MMRP).

[5] Acoustic thermometry is a method for obtaining information about the temperature field in the ocean from precise measurements of the travel times of sound pulses transmitted through the ocean. It is also a technique for acoustic remote sensing of the ocean interior, in which the properties of the ocean between the acoustic sources and receivers are determined, rather than the properties of the ocean at the instruments as is the case for conventional thermometers and current meters. The basic principle behind acoustic thermometry is that, because sound travels faster in warm water than in cold water, sound travel time is a direct measure of the average temperature between source and receiver.

[6] §930.91 defines ''federal assistance'' as "assistance provided under a federal program to an applicant agency through grant or contractual arrangements, loans, subsidies, guarantees, insurance, or other form of financial aid." §930.92 defines ''applicant agency'' as "any unit of State or local government, or any related public entity such as a special purpose district, which, following management program approval, submits an application for federal assistance."

3. Placing and burying the cable through the surfzone and intertidal waters needed landowner permission, from the Fitzgerald Marine Reserve (located from the mean high tide to 1000 ft. offshore, and managed by the California Department of Fish and Game) in intertidal and subtidal waters, and from the California SLC (a permit or lease) from the shoreline out to three miles, as well as a coastal development permit from the CCC from the shoreline out to three miles.

4. A number of federal permits triggered federal consistency review for the cable and the sound source:

   (a) approximately the first 30 mi. of the 48 mi. cable was within the Monterey Bay National Marine Sanctuary (NMS) and therefore needed a permit from the NMS program (NOAA's Sanctuaries and Reserves Division);

   (b) the sound source affected marine mammals and needed a scientific research permit under the Marine Mammal Protection Act from the National Marine Fisheries Service (NMFS) (as well as Endangered Species Act "Section 7" consultation with NMFS and the U.S. Fish and Wildlife Service); and

   (c) U.S. Army Corps of Engineers "Section 10" (of the Rivers and Harbors Act) was needed for the cable within the 3 mile limit of state waters.

Several additional points worth mentioning or reiterating here about process are:

(1) despite the complexity of authorities, the CCC performed a single, combined consistency certification and coastal development permit review for the activity;

(2) for purposes of illustration, *if* ATOC had been a *federal project* (as opposed to being a federally-*permitted* project)[7], then only two state authorities would have been invoked, as federal agencies are exempt from the need for state regulatory permits; thus, a hypothetical *federal* "ATOC" would be subject to only federal consistency review from the CCC, and, for the portion of the cable within the 3 mi. limit, state landowner (CSLC) permission; and

(3) despite portions of the project being located within state tidelands, it is only the federal law (CZMA) that enables states to review effects on coastal zone resources from portions of the activity located outside state waters.

[7] In fact, the California ATOC cable has now been transferred to the federal government (NOAA) to be used for passive acoustic research, and the active sound source has been disconnected.

[Note: the ocean portion of a state's coastal zone is the same as the state's 3 mi. limit, although it also includes ocean waters 3 mi. around any offshore island, so while ATOC is 48 nautical miles (n. mi.) from the mainland, it is approximately 30 n. mi. from the southernmost Farallon Island and, therefore, 27 n. mi. from the seawardmost extent of state waters surrounding the island.]

D. Other Examples of Acoustic Activities. Additional examples of activities regulated by the states involving noise and acoustic issues in state and federal waters include:

1. Military Activities (predominantly U.S. Navy), including use of loud sonar, and particularly the Navy's "LFA" sonar,[8] and Navy ship shock testing using underwater explosions.

2. Other Federal government activities, including USGS seismic surveys to map underwater geologic structures, and NMFS "Pulsed Power" experiment (acoustic deterrent to sea lion predation).

3. Oil & Gas Industry activities, particularly: seismic surveys, removal of underwater structures (e.g., offshore oil platform legs, trestles) using explosives, and well drilling.

4. Miscellaneous activities, including use of explosives or pile driving for bridges, piers, and other shoreline structure construction or demolition.

E. California's Program. As noted above, the CCC began issuing coastal development permits in state waters and in the coastal zone in 1973, after passage of the original Coastal Act. The CCC's federally-certified coastal management program was certified in 1976, and in 1977 the CCC began its review of federal agency activities under the CZMA The policy basis for both state law and federal consistency reviews (of activities in or affecting state water resources) are the resource protection policies contained in Chapter 3 of California Coastal Act of 1976. The Coastal Act is a broad-based policy document, including specific policies addressing public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, universities and public works. The applicable policy guiding marine resource protection, also a broad-based policy, is Section 30230 of the Coastal Act, which provides:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a

[8] Surveillance Towed Array Sensor System Low Frequency Active ("SURTASS LFA") Sonar

> *manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

In addition, protection for commercial and recreational fishing activities is found in Sections 30234 and 30234.5, which provide

> *Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry. [30234]*
>
> *The economic, commercial, and recreational importance of fishing activities shall be recognized and protected. [30234.5]*

In the California cases discussed below, these policies form the primary basis under which marine resource and fishing protection measures were justified. In addition, these policies plus the general recreation protection policies (Sections 30213 and 30220 of the Coastal Act) are cited to address recreational diving concerns.

F. <u>Local Regulation</u>. While many of the CCC's planning and regulatory responsibilities have been delegated to local governments (once their local coastal programs are certified by the CCC), underwater acoustic activities have not, for essentially two reasons: (1) the CCC retains state permit jurisdiction over all tide and submerged lands; and (2) the federal consistency authority rests with the designated state coastal management agency[9]. Finally, the author has not found examples to date of *local* regulation of underwater acoustics. One possible exception to this is County Air Pollution Control District (APCD) regulation of seismic surveys in California waters, under the Clean Air Act; however to date the APCDs have limited their reviews to addressing and mitigating air quality impacts, and they have not addressed non-air quality-related (i.e., noise or marine environment) effects. Also, while in theory local governments could have granted tidelands (i.e., ownership) responsibilities, no cases of the use of such authority to regulate underwater noise or acoustics have been found.

[9] The CCC is one of California's two designated coastal management agencies for the purpose of administering the CZMA in California. The San Francisco Bay Conservation and Development Commission (BCDC), also a state agency, retains this authority within San Francisco Bay, while the CCC exercises this authority for the rest of California's coastal zone.

III. Milestones

Milestones and important studies in the history of underwater noise regulation include:

1. Noise Studies/Gray Whale Migration. Studies by Malme, et al. in the early 1980's established impacts to gray whale migration from relatively common industrial noise (e.g., oil well drilling noise). After these studies were published, seasonal restrictions began to be implemented, such as conducting noise-related activities in a manner avoiding the gray whale migration season in California, and the bowhead whale migration season in Alaska.

2. Fish Dispersal, Eggs and Larvae Studies. Studies funded by the U.S. Minerals Management Service (MMS) in 1985 (Greene, C.R., Jr.) and 1987 (Holliday, et al.), looking at seismic survey airgun effects, established that intense seismic survey activities airguns could reduce fishing success (i.e., fish dispersal effects) and could disrupt biological functions (i.e., effects on fish eggs and larvae development). These studies intensified already existing conflicts between the oil and gas industry and the commercial fishing industry, and were among the first to document possible biological effects on marine resources as well.

3. Heard Island Feasibility Test. In 1992 the Heard Island Feasibility Test (HIFT) documented the ability of sound to travel phenomenal distances through the deep sound (SOFAR[10]) channel to receivers over distances of up to 17,000 kilometers (km). Dubbed "the shot heard half way round the world," a sound level of 221 decibels (dB[11]) (frequency, 57 Hertz (Hz)) was transmitted through the SOFAR channel, demonstrating the tremendous potential for transmitting sound at transoceanic distances. HIFT served as a prototype for regular observations of the speed of sound in the ocean for measuring the rate of ocean warming due to global climate change (e.g., ATOC). At the same time this global transmission power heightened concerns over the potential for sound to affect marine mammals over extremely large areas.

4. National Research Council (NRC) Review. In part as a result of issues raised by HIFT, the Office of Naval Research (ONR) requested in 1992 that the National Research Council (NRC) examine the state of knowledge of the effects of low-frequency sounds on marine mammals, and assess the trade-offs between the benefits of underwater sound as a research tool and the possible harmful effects on marine mammal populations of introducing additional low-frequency sound into the ocean. In 1994 the NRC issued a report, *Low Frequency Sound and Marine Mammals: Current Knowledge and Research Needs,* which concluded that: (1) very little is known about the effects of low-frequency sound on marine

[10] SOFAR is an acronym for Sound Fixing and Ranging.

[11] Note: All decibel references in this report are based on the water reference standard (re: 1 micropascal (μPa)). All source level (SL) dB units are referenced to 1 micropascal @ 1 meter. All received level (RL) units are expressed as dB units re 1 uPa root mean squared (rms).

mammals; and (2) it is difficult to establish regulatory policy in the absence of data regarding such effects. The report included a series of recommendations about the kinds of research needed to fill the knowledge gaps.

5. Marine Mammals and Noise. In 1995, Richardson et al. published a comprehensive and often cited *Marine Mammals and Noise* (W. John Richardson, Charles R. Greene, Jr., Charles I. Malme, Denis H. Thomson), which exhaustively documented the entire spectrum of anthropogenic underwater noise sources and their effects known to date, as well as documenting future data needs and recommended research.

6. NATO LFA/Whale Strandings. In May 1996 12 Cuvier's beaked whales were involved in a mass stranding over a 38 km stretch of coastline during NATO LFA exercises in the Mediterranean Sea, off the west coast of Greece. A March 5, 1998, *Nature* article by Alexandros Frantzis, entitled "Does acoustic testing strand whales," concluded that "… the probability of a mass stranding occurring for other reasons during the period of the LFAS tests is less than 0.07%" and that "Although pure coincidence cannot be excluded, it seems improbable that the two events were independent." This article stimulated NATO to convene a Bioacoustics panel (SACLANTCEN) to study the event and review the data; the panel published a Summary Record in June 1998, which: (1) suggested close timing between the onset of sonar transmissions and the first strandings; (2) was unable to determine the received levels experienced by the stranded whales; (3) noted that received levels as high as 150-160 dB were estimated to occur at ranges of 50 km; and (4) stated that sperm whales were heard within 10-25 km of the sound source, but demonstrated no obvious changes in their clicking patterns before, during, and after sonar transmissions. In the end, though, because autopsies did not provide ear tissue samples, the NATO panel had difficulty coming to definitive conclusions linking NATO's LFA to the strandings, although it did rule out natural physical environmental factors.

7. Navy Acknowledgement of LFA/Further Navy Studies. Before 1997, the Navy operated LFA sonar in secret. During more or less the same time period as public agency review of ATOC and the public's awareness of the NATO LFA controversy in the Mediterranean, the Navy acknowledged the existence of its own past and ongoing LFA sonar programs, including publication of non-classified after-the-fact documentation of a number of past Navy LFA operations occurring during or after 1994 [Note: pre-1994 LFA exercises were not documented]. Due to evolving concerns over Navy LFA, in July 1996 the Navy agreed to prepare an EIS and delay further use of LFA until its completion. To assist this effort, the Navy designed a three-phased program to study LFA effects on a variety of marine mammal behaviors, including: (1) feeding blue and fin whales off San Nicolas Island; (2) migrating gray whales off Big Sur; and (3) humpback breeding and vocalization offshore of Hawaii.

The purpose of the research was not to document the effects of the sound levels of normal LFA operation, but rather to explore and refine information about the thresholds of marine mammal behavioral modifications; thus, the research phases were limited to intentionally exposing animals to received levels (RLs) ranging from 120 to 155 ($\pm$ 5) dB. (Note: Full operational sound levels from an individual element of the multi-element LFA sonar array is

approximately 215 dB.) The results of first phase were relatively inconclusive; the Navy stated the results showed "… no pronounced disruption of feeding behavior from whales exposed to RLs from 110 to 153 dB." The second phase results showed gray whale responses similar to those observed in earlier research (Malme et al., 1983; 1984), when the source was moored in the migration corridor. However, when the source was placed offshore of the migration corridor, the avoidance response was not evident. The third phase showed some avoidance responses and cessation of humpback whale singing (at RLs ranging from 120-150 dB). The Navy noted that further analysis would be needed to evaluate the significance of the song cessation. The Navy also noted that: "Of the whales that did stop singing, there was little response to subsequent pings. Most joined with other whales or resumed singing within less than an hour of the possible response."

As of the date of this writing, NMFS is currently reviewing an incidental take permit under the Marine Mammal Protection Act for the LFA program worldwide.

8. The Bahamas Whale Strandings. On March 15-16, 2000, 16 whales of four different species beached themselves in the Bahamas off the east coast of the U.S., coinciding with Navy sonar and testing activities. Seven whales died, including four Cuvier's beaked whales, a Blainville's dense beaked whale, and a spotted dolphin. Unlike the NATO situation, this time necropsies were performed, and NMFS reported that: "The injuries to the six beaked whale heads were all consistent with an intense acoustic or pressure event. … These animals died from being stranded. We do not know what caused the animals to strand, but we think it is possible that the animals suffered vestibular effects (disequilibrium and disorientation) from an acoustic or pressure event." NMFS and the Navy are still investigating this incident as of the date of this writing. This event significantly intensified concerns over the effects of anthropogenic noise, and Navy sonar in particular, on marine mammals.

IV. Activities Regulated by States

California

1. Scripps ATOC

Date: June 1995
Location: Sound source outside state waters, cable within and seaward of state waters and on land, northern California (within and offshore of San Mateo County)
Applicant: Scripps Institution of Oceanography (Scripps)
Project: California Acoustic Thermometry of Ocean Climate (ATOC)

Scripps proposed ATOC to make regular measurements of the travel times of low-frequency sound throughout the Pacific Ocean, using sound up to 195 dB and a frequency of 75 Hz, 3% duty cycle, of transmitted from a source located at Pioneer Seamount, 48 n. mi., in 980 meters of water, offshore of Half Moon Bay in northern California.

Procedures: As explained on pages 4-5, the project needed concurrence with a consistency certification and approval of a coastal development permit from the CCC, and a lease from the CSLC. In June 1995 the CCC concurred with Scripps' consistency certification and approved a coastal development permit with conditions for this program (CC-110-94 & CDP 3-95-40).

Mitigation Measures:

Modify the scope and duration focus to be primarily a Marine Mammal Research Program (MMRP), and only secondarily an acoustic thermometry program, to monitor the biological effects of the sound transmissions, and to reduce the project from 5 years to 2. In addition to the monitoring Scripps agreed to:

- Ramp-up procedures[12].

- Operate ATOC at the minimum duty cycle necessary to support MMRP objectives and ATOC feasibility objectives.

- Cease the ATOC project in the event significant adverse impacts are occurring, with specifically defined shut-down criteria.

- Allow the MMRP research group to maintain control over the sound source for the entire 2 year period.

- Expand the scope and membership (including a citizen observer) of the independent MMRP advisory board.

- Remove the sound source as soon as is feasible after the 2 year project (see footnote 7, p. 5; the source has been transferred to NOAA for use as a passive acoustic device, and the sound source has been disconnected).

- Acknowledge that authorization at this time is not a commitment to use of this location (Pioneer Seamount) for future ATOC studies, and that an essential siting criterion for a long term site will be: Location in an area with minimal abundances of marine life that might possibly be adversely affected by low frequency sound.

- Prepare a Programmatic EIS/R prior to any long term ATOC activities.

- Include a fisheries biologist on the MMRP advisory board and include monitoring of impacts on fish behavior.

[12] The ramp-up procedure involves the gradual increase in intensity of a sound source from a base level to full operating intensity over a period of several minutes.

2. Navy LFA Phase I and Phase II Research

Date: 1997
Location: Sound source outside state waters in Phase 1, and within state waters for Phase II
Applicant: U.S. Navy
Project: LFA Research, Phase I off San Nicolas Island and Phase II off Big Sur

These first two of the LFA Research phases were designed to study: (1) feeding blue and fin whales off San Nicolas Island (Southern Channel Islands, offshore of southern California); and (2) migrating gray whales off Big Sur (offshore central California), using sounds in the 120-160 dB range at low frequencies (100-500 Hz), < 20% duty cycle, beginning with relatively low intensities and gradually increasing intensities in an effort to determine the threshold where documentable behavioral reactions could be observed.

Procedures: As a federal agency project affecting coastal zone resources, the Navy submitted consistency determinations for each phase (CD-95-97, Phase I, and CD-153-97, Phase II). The CCC concurred with both consistency determinations, in August (Phase I) and December of 1997 (Phase II).

Mitigation Measures:

- Prevent animals from exposure above 160 dB (i.e., cessation of a playback if any marine animal is detected within 100 m of the playback vessel, or at a location such that if it dove from its present location to its usual dive depth it would be exposed to a level >180 dB).

- Ramp-up procedures.

- Funding for an expert in the anatomy of the auditory system of marine mammals, to come to any of the field sites should a whale strand in the area during the playbacks. If a necropsy indicates any sign of auditory damage, the playbacks will be stopped "unless and until it is concluded that the playbacks could not have been responsible for any injury."

- Provisions for peer review and independent observers.

- With respect to non-focal animals, particularly whales, transmissions would be suspended, if in the opinion of the principal investigator, such animals are demonstrating exaggerated behavior, rapid and erratic breaching, and extended surface periods, contemporaneous with LFA transmissions.

- With respect to focal animals, cessation or suspension of transmission in the event of any acute reactions to the source. The definition of "acute" reactions include: reversal of swim direction, slowing, major deflection from migratory route, and/or repeated/prolonged, or excessive activity (severe breaching, prolonged time on surface, etc.).

- Experiment with both a "whale-type" signal and a "random noise-type" signal (both of which represent sounds the LFA system is capable of transmitting).

Note: CCC review of Navy Operational SURTASS LFA sonar is still pending (CD-113-00). The Navy submitted a consistency determination on November 8, 2000; however the Navy subsequently requested that the matter be placed "on hold" and has extended the statutory time period for CCC review.]

3. <u>Navy ADS</u>

Date: December 1998
Location: Within state waters (and with cables to shore on federal lands), offshore of Camp Pendleton, Southern California
Applicant: U.S. Navy
Project: Advanced Deployable System (ADS) Ocean Tests, a primarily *passive* acoustic monitoring system (but with active acoustics needed to test the passive system), designed to detect, locate, and report surface vessel and submarine activities in littoral (nearshore) marine environments. Active acoustic tests would include 1,344 hours of active tests (104 hours of pulsed sounds and 1,240 hours of continuous sounds) for up to 56 days of active (and a total of 265 days of active and passive) testing over the 3-year test period. Sound levels: 130-170 dB for continuous sounds and 120-175 dB for pulsed sounds. The location and frequency of the sounds were "classified" by the Navy, although general frequency ranges were divulged.

Procedures: As a federal agency project within the coastal zone, the Navy needed to submit a consistency determination for the activity (CD-109-98). The CCC concurred with this consistency determination in December 1998.

Mitigation Measures:

- Visually inspect the area during all active transmissions, and avoid exposing marine mammals to continuous sounds exceeding 120 dB (e.g., 320 meters preclusion radius for mysticetes (baleen whales), with a time element built in (1/2 hour limit) for "less sensitive" odontocetes (toothed whales) and pinnipeds), and to pulsed sounds exceeding 175 dB (10 meters preclusion radius).

- No nighttime transmissions >140 dB;

- Special restrictions for reduced-visibility weather conditions (e.g., fog);

- Avoid transmissions within the Channel Islands National Marine Sanctuary (including waters 1 mi. beyond the Sanctuary boundary) and within 3 mi. of all other islands;

- Avoid all areas shallower than 200 ft. (60 meters) (again, including around islands);

- Avoid transmissions within 0.5 miles of diving activities; and

- Monitor and report to the CCC the mammal sightings and avoidance measures taken.

- Avoid active transmissions within known gray whale migration paths.

4. <u>NMFS Pulsed Power tests</u>

Date: December 1999
Location: Within state waters, offshore of Camp Pendleton, Southern California
Applicant: National Marine Fisheries Service
Project: Small-scale test of a "pulsed power" device (including a shock wave) intended to deter sea lion depredation on sport fishing charter boats.

Procedures: As a federal agency project within the coastal zone, NMFS needed to submit a consistency determination for the activity (CD-102-99). The CCC objected to this consistency determination in December 1999.

Mitigation Measures:

- Monitor non-target marine mammals and other species to prevent exposing any non-target animal to greater then 180 dB (i.e., if any marine mammals other then sea lions approach within 200 meters (656.2 feet) at the 1.34 kJ (kiloJoules) power level or 262 meters (859.6 feet) at the 1.8 kJ power level, NMFS would turn off the device).

- Turn off the device if a sea lion approaches close enough to be exposed to sound levels greater than 205 dB (i.e., 18 m (59.1 ft.) at the 1.34 kJ power level and 26 m (85.3 ft.) at 1.8 kJ). [Note: The sound level that the sea lions would be exposed to was intentionally greater than the threshold for effects (180 dB in this instance), because the intent was not to avoid disturbing, but rather to deter sea lion predation.

- Use three monitors to identify target and non-target marine animals, and cease transmissions: (1) near marine mammal rookeries; (2) when weather conditions do not permit adequate visual monitoring of marine mammal protective buffer zones (200 meters) or collection of data; or (3) when dive flags are in the vicinity.

  Note: Despite the mitigation measures, the CCC objected because NMFS: (1) had not evaluated the effects from the pulse power device on sea lions and demonstrated that the proposed test avoid physiological damage; and (2) proposed

to expose sea lions to sound pressure greater than 180 dB. The CCC was also concerned over the use of a shock wave to enhance the deterrent effect, and with the adequacy of monitoring for both target and non-target animals. NMFS subsequently agreed to accept the CCC's action and elected not to proceed with the activity.]

5. <u>Mobil Oil Co. Pier and Wharf Decommissioning</u>

Date: 1997
Location: Within nearshore state waters, offshore of Ventura, Southern California
Applicant: Mobil Exploration and Producing U.S., Inc., Rincon Island Limited Partnership
Project: Pier and Wharf Demolition, including removal of large caissons (one 22 ft. diameter steel reinforced concrete caisson, and a number of 8 ft. diameter caissons), using dynamite charges drilled into holes drilled into the caissons. The weight of the explosives was 595 lbs. in the 22 ft. caisson, and 111 lbs. in the 8 ft. caissons (which produced more external pressure and noise dispersion than the larger charges in the 22 ft. caisson).

Procedures: As a private activity and "development" within state waters, Mobil Oil need a coastal development permit from the CCC, as well as a lease from CSLC. The CCC granted a permit with conditions in December 1997 (E-96-14).

Mitigation Measures:

- Establish marine mammal monitoring and avoidance area (a 1000 yard wildlife safety zone).

- Since the estimated safety zone was based on modeling, due to the notorious difficulty in accurately modeling and estimating sound pressure levels/acoustic footprint in nearshore shallow waters, monitoring and field verification of the acoustic footprint early in the demolition (and revision of safety zones if warranted).

- Blasting mats and bubble curtains were used to attempt to absorb some of the sound.

[Note: The monitoring report subsequently provided, *Acoustical Monitoring Plan for Mobil Seacliff Pier Decommissioning Project Northwest of Ventura, CA,* Mobil, Jan. 14, 1998, showed actual pressure levels greater than had been modeled, with sounds > 180 dB at 2000 yds., (rather than the 1000 yds. predicted). Consequently the wildlife safety zone was increased significantly. The actual measurements showed 200 dB levels at 1000 yds., levels > 180 dB at 2000 yds. in several locations, and with a maximum level at 3000 yds. (1.7 mi.) of 181.1 dB. The report also showed that bubble curtain appeared to have little effect, although it may have reduced fish mortality.]

6. USGS Seismic Surveys

Date: 1991, 1998-2000
Location: Within nearshore state and federal waters, in San Francisco Bay (1991, state waters) offshore of Puget Sound (1998, Washington), and offshore of Southern California (1999, federal waters, and 2000, state and federal waters)
Applicant: U.S. Geological Survey
Project: Seismic Surveys to map earthquake faults and other subsea stratigraphic information

1991 Survey, Northern California, using a 10 gun, 5828 cu. in. array, only 2-3 days in CCC jurisdiction (with the rest within the jurisdiction of the San Francisco Bay's designated coastal management agency for the San Francisco Bay, the San Francisco Bay Conservation and Development Commission (BCDC)).

1998 Survey, Puget Sound (off the coast of the State of Washington, which did not review the activity under the federal consistency provisions), using a 16-gun, 5,300 cu. in. array.

1999 Survey, southern California (originally proposed in state and federal waters; however when the CSLC would not authorize the activity within state waters absent an Environmental Impact Report, USGS withdrew the state water portion of the survey and only proposed federal water surveying, using a small airgun (40 cu. inches), with a maximum sound level of 220 dB.

2000 Survey, southern California, using a lower energy device (a minisparker instead of an airgun), in state and federal waters.

Procedures: As a federal agency project within the coastal zone, USGS needed to submit consistency determinations for the surveys. The CCC and BCDC concurred with the first survey (CD-47-91). The CCC initially objected to the second survey (CD-32-99); however, the concern was subsequently resolved and the CCC ultimately concurred. The CCC concurred with the third survey (CD-16-00).

Mitigation Measures:

- 1991 Survey: Include trained marine mammal observers and prepare a monitoring report

- 1998 Survey: Although not reviewed by the State of Washington, USGS still included trained marine mammal observers and prepared a monitoring report.

- 1999 Survey: Include trained observers and monitoring marine mammals in the survey vicinity.

- Avoid subjecting mysticetes to sound levels above 180 dB, and odontocetes and pinnipeds to 190 dB. USGS estimated that the sound would attenuate to 180 dB within 40 m of the source; however USGS increased the safety buffer and initially committed to a safety zone of 100 m for mysticetes and 50 m for pinnipeds and odontocetes. When concerns were raised about the lesser standard for odontocetes, USGS agreed to modify the project to expand the marine mammal protection radius for odontocetes to be the same as mysticetes.

- Because nighttime operation significant reduced visibility and ability to detect marine mammals, which was acknowledged in earlier monitoring reports (i.e., because the clearly observable area at night (20-30m) was smaller than the recommended mammal preclusion radius (100 m)), USGS agreed to avoid nighttime use of the main airgun.

- Avoid the gray whale migration season.

- Due to procedural concerns raised by the CSLC, USGS modified the project to avoid operating within the 3 mile limit of State waters.

- 2000 Survey: Use a lower energy device (a minisparker instead of an airgun), which has several benefits: the 180 dB area of acoustic footprint is much smaller, enabling USGS, even at night, to maintain visibility within the area for preclusion of marine mammals, and from a procedural standpoint, use of this device enabled USGS to receive CSLC approval to work in State waters.

- Monitor marine mammals in the survey vicinity and avoiding subjecting marine mammals to sound levels above 180 dB (30 m in deep water and 15 m in shallow waters). When concerns were raised USGS agreed to expand the preclusion area for nearshore waters to be the same 30 m radius as was agreed to for deeper waters.

- Avoid the gray whale migration season.

7. Oil Company Seismic Surveys

Date: Various dates
Location: Primarily within the Santa Barbara Channel, but occasionally in other portions of California offshore state and federal waters
Applicant: Various oil companies
Project: Seismic Surveys to map underwater geologic structures for oil and gas exploration purposes

Procedures/History:

In the 1980s, hundreds of oil company seismic surveys were conducted in California offshore waters pursuant to joint permits issued by the Minerals Management Service (MMS) and the CSLC. The CCC did not formally review these surveys, but encouraged conflict resolution

between commercial fishermen and oil companies through the then-existing available (and relatively successful) mediation services of the joint oil and fisheries liaison office in Santa Barbara County.

The major concerns in the 1980's were primarily: (1) impacts to commercial fishing equipment from the long tow lines used by the oil companies; and (2) impacts of loud noises on fish catch success and fish development (e.g., eggs and larvae development). Current concerns over effects of low frequency noise on marine mammals had not evolved at that time. In 1988, based in part on the fish catch and "eggs and larvae" studies, the CSLC discontinued its practice of authorizing seismic surveys in State waters, and determined that an Environmental Impact Report would be required before it would consider further surveys. Since that time, the CSLC has not authorized any high-energy" seismic surveys in state waters. While this position was litigated by the oil industry, the CSLC prevailed at the California Court of Appeals.

In 1995 the CCC agreed with a "No Effects" determination (i.e., the CCC declined to assert federal consistency jurisdiction) for an Exxon Oil Co. 30 day, 117 sq. mi. area, seismic survey at the Santa Ynez unit in federal waters offshore of Santa Barbara County. The CCC agreed not to require a consistency certification in part due to Exxon's incorporation of marine mammal protection measures, including visual, aerial and acoustic monitoring, acoustic model verification, marine mammal preclusion/avoidance areas, and other measures being required through the NMFS marine mammal harassment permit. Nevertheless, due in part to the controversy, extensive time it took for regulatory approvals, and growing interest in marine mammal issues, an inter-agency task force to address the issues was convened by the Minerals Management Service.

This effort became known as the "HESS" Team, which stands for High Energy Seismic Survey Team. The team consisted of an intergovernmental effort consisting of broad cross-section of state and federal regulators, oil and gas and commercial fishing interests, local government, marine research, geophysical operators, and environmental organizations, meeting in a mediated setting, to attempt to fashion a coordinated regulatory approach and consensus decisionmaking for high energy seismic activities. The Team's output was a report called *High Energy Seismic Survey Review Process and Interim Operational Guidelines for Marine Surveys Offshore Southern California.*

Mitigation Measures:

This HESS team report (dated February 19, 1999) contains operational guidelines concerning review procedures and recommended mitigation/avoidance/monitoring measures for agencies to consider in analyzing high energy seismic surveys. The key elements of the HESS recommendations are:

- Visual monitoring (a minimum of 2 shipboard observers) and designation of safety zones and preclusion areas avoiding subjecting marine mammals to sounds > 180 dB; observers have authority to shut down if animal within safety area.

- Field verification of transmission loss models (down to 160 dB) at commencement of survey.

- Ramp-Up (starting with smallest airgun and increasing power at a rate of 6 dB/minute).

- Nighttime operation to be reviewed on a case-by-case basis.

- When operating under conditions of reduced visibility due to adverse weather conditions, operations may continue unless, in the judgment of the shipboard observers, the safety zone cannot be adequately monitored and observed marine mammals densities have been high enough to warrant concern that an animal is likely to enter the safety zone.

- Aerial monitoring and surveys to document baseline conditions, project-related impacts, and post-project conditions for numbers and distributions of mammals.

- Possible use of passive acoustic monitoring systems, if such systems become feasible.

Hawaii

1. Scripps ATOC (now NPAL[13])

Date: 1995, and 2001
Location: Offshore of north shore of Kauai, Hawaii, with sound source 8 mi. offshore, with a cable to shore
Applicant: Scripps Institution of Oceanography (Scripps)
Project: Hawaii Acoustic Thermometry of Ocean Climate

Purpose similar to California ATOC: to make regular measurements of the travel times of low-frequency sound throughout the Pacific Ocean, using sound up to 195 dB and a frequency of 75 Hz, 3% duty cycle, using the SOFAR channel and at a depth of 807 meters.

Procedures: Hawaii conducted separate federal consistency and state permit reviews of ATOC. While the sound source was beyond the 3 mile limit that defines state jurisdiction for most states, Hawaii asserts a broader jurisdiction over state waters, based on its status as a separate nation before assuming statehood. The State of Hawaii notes:

> *The Hawaiian Archipelago includes all the islands of Hawaii and extends to the Northwestern Hawaiian Islands. Geographically speaking, Hawaii archipelagic waters include the waters between the islands and is often greater than the federally recognized 3 & 12 mile boundaries. The Hawaii statutory definition of "state marine waters" is "state marine waters shall be defined as extending from the upper reaches of*

[13] North Pacific Acoustic Laboratory

the wash of the waves on shore seaward to the limit of the State's police power and management authority, including the U.S. territorial sea, notwithstanding any law to the contrary." The Hawaii CZM area is statutorily defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the Unites States territorial sea." So, Hawaii marine waters and CZM waters are the "archipelagic waters" and can be greater than the 12 mile territorial limit. However, for CZM federal consistency purposes, the federal government will only recognize 3 miles for management.

Hawaii originally approved ATOC in 1995, and granted a 5-year extension in 2001. As was the case in California, Hawaii's original review including modifying ATOC to be fundamentally a marine mammal research program (MMRP), and only secondarily an acoustic thermometry program. However when the initial results were limited to only "subtle" effects on marine resources, Hawaii granted a 5-year extension of ATOC.

Mitigation Measures:

- Use minimum duty cycles necessary to support objectives (average duty cycle of 2%).
- No > 2% duty cycles during humpback whale season (Jan-Apr).
- Ramp-up (over 5 min. period).
- Monitoring (including aerial surveys, concentrated within humpback whale season).
- Coordination of monitoring results with NMFS, marine mammal stranding networks, State of Hawaii, and NOAA Sanctuaries.
- Cessation of transmissions if circumstances warrant (e.g. acute reactions, short or long term effects).

2. <u>Navy LFA – Hawaii Phase III Humpback Whale Research</u>

Date: 1998
Location: Offshore of Kohala Coast, Island of Hawaii
Applicant: U.S. Navy
Project: LFA Research, Phase III, humpback and sperm whale research

Procedures: As a federal agency project affecting coastal zone resources, the Navy submitted a consistency determination for this phase of the research.

Mitigation Measures:

- Mitigation measures identified in Section 5 of December 17, 1997 Draft Environmental Assessment.

- Coordinate all aspects of the research program with the Hawaiian Islands Humpback Whale National Marine Sanctuary Manager, in the event of any whale stranding or invocation of any shut-down protocol.

- Submit all research results, and any project modifications to Hawaii coastal management program.

3. Navy Operational LFA - Hawaii

Date: 1997
Location: Federal waters offshore of Hawaii
Applicant: U.S. Navy
Project: Surveillance Towed Array Sensor System Low Frequency Active ("SURTASS LFA") Sonar Program

LFA is a sophisticated military sonar technology designed to actively detect and track submarines at longer ranges than conventional (higher frequency) active sonar systems, with the source level (SL) of an individual element at 215 dB[14], 18 elements total for each ship, with up to 4 ships operating worldwide (by the year 2004, but with no more than two in any one ocean), a frequency of 100-500 Hz, a < 20% duty cycle, waveforms that vary in frequency and duration (a complete sequence, or "ping," lasts between 6 and 100 seconds, although the duration of each continuous frequency sound transmission is not > 10 seconds), and a yearly total of up to 432 hours of active transmissions per ship.

Procedures: As a federal agency project affecting coastal zone resources, and as it did for many coastal states, the Navy submitted a consistency determination to Hawaii for operational use of LFA.

Mitigation Measures:

As a worldwide program, the Navy incorporated mitigation measures that were programmatic and applicable to its consistency determination submitted to all the coastal states. Hawaii requested additional measures, which are described after these programmatic measures:

Programmatic measures

In its EIS, the Navy has incorporated operational and geographic restrictions and short- and long-term monitoring measures, as follows:

[14] The Navy explains that, through the focusing power of the array, the source level of each element is over 25 dB less than the integrated source level of the entire array.

Operational and Geographic Restrictions:

- Monitor sonar operations to prevent injury to marine mammals (and possibly sea turtles) by ensuring, to the maximum extent possible, that they are not within the LFA mitigation zone (i.e., the 180-dB sonar sound field) during LFA transmissions (generally 1 km from the source at full power);

- Geographic restrictions, including: assuring that the sound field does not exceed: (1) 180 dB within 22 km (12 nm) of any coastline (including islands) and a few specified offshore "biologically important areas" (migration corridors, breeding and calving grounds, and feeding grounds, including the Antarctic Convergence Zone near Antarctica and the 200 meter isobath off the east coast of North America); and (2) 145 dB in the vicinity of known recreational and commercial dive sites.

Short-term monitoring

- Visual monitoring for marine mammals and sea during daylight hours.

- Use the passive (low frequency) SURTASS array to listen for sounds generated by marine mammals as an indicator of their presence.

- Use high frequency (HF) active sonar to detect/locate/track potentially affected marine mammals (and possibly sea turtles) near the SURTASS LFA sonar vessel and the sound field produced by the SURTASS LFA sonar source array.

Long-term Monitoring.

- Conduct and coordinate with NMFS on the effectiveness of proposed mitigation measures, and on an assessment of whether any taking of marine mammals occurs within the 180-dB sound field.

- Study the potential effects of Navy SURTASS LFA sonar-generated underwater sound on long-term ecological processes.

- Collaborate with Navy, academic, and industry laboratories and research organizations, and where applicable, with Allied navy and academic laboratories.

- Provide for incident monitoring and coordination with diver organizations and marine mammal stranding networks.

> [Note: NMFS is still in the process of reviewing the incidental take permit for LFA; thus, these measures could be amended or expanded on a programmatic bases through that review.]

Additional measures for Hawaii

Hawaii negotiated several changes and clarifications to use of Navy LFA offshore of Hawaii. The State concurred with the understanding that the Navy would agree to several stipulations negotiated between the State and the Navy (and the Navy subsequently informed Hawaii it would agree to these measures), including:

- A 145 dB maximum (and no actual LFA source operation) within the 3 mile limit of State waters or within the Penguin Bank area (southeast of Oahu, to a depth of 100 fathoms). (Note: Penguin Bank is an area extending westward of the island of Molokai and is within State marine waters but outside of the 3 mile federally recognized CZM area [see indented note, p. 19.)

- Any documented disturbance of protected marine species or significant effect on fisheries, verified by the State, shall lead to immediate review of operations and cessation of sonar transmissions "as deemed necessary." Such disturbances could include changes in abundance or spatial distribution, or changes in short- or long-term behavior.

- Any documented disturbance to divers or swimmers within the 3 mile limit, verified by a doctor and evaluated by the State, shall lead to immediate review of operations and cessation of sonar transmissions "as deemed necessary."

- If there is conclusive evidence of significant disturbance to humans, marine mammals, turtles or fishes (as specified above), the State will re-evaluate its concurrence under the CZMA.

- Divers (commercial and recreational) will be provided notice prior to any unclassified LFA deployment.

- Submittal of annual monitoring reports to the State.

- Solicit advice from (and share data with) the State of and the University of Hawaii concerning long term monitoring efforts.

- The maximum deployment offshore of Hawaii would not exceed 288 hours of transmission/year (i.e., maximum of 2 missions per year each for 2 LFA ships, with one mission totaling 72 hours).

- All NEPA described monitoring efforts (see programmatic list above) would be fully implemented.

4. Navy Shallow Water Tracking Range

Date: 2001
Location: Federal waters offshore of Hawaii in the Maui basin, a 60 n mi. area between 3 islands (Maui, Lanai, and Kahoolawe) but predominantly > 3 mi. offshore
Applicant: U.S. Navy
Project: Shallow Water Tracking Range, an underwater submarine tracking and instrumentation system

Procedures: As a federal agency project affecting coastal zone resources, the Navy submitted a consistency determination to Hawaii for the Shallow Water Tracking Range

Mitigation Measures:

- Ramp-up.
- Minimize transmissions during humpback whale season (Jan-Apr).
- Avoid to the extent possible torpedo firings during humpback whale season.
- Visual and passive acoustic monitoring.
- Maintain levels of activity at historic rates.
- Minimize conflicts between submarine operations and commercial and recreational fishing activities.

Other States

Polling of other states concerning acoustic activities has revealed less extensive degrees of regulation of underwater noise. The information that was provided by other states indicates that the State of **Alaska** regulates Oil Company Seismic Surveys, with the primary mitigation measure focusing on seasonal restrictions to avoid peak fishing periods and marine mammal migration (particularly bowhead whales). Most coastal states polled indicated they did not raise concerns over the Navy's LFA; thus only California, Hawaii, and **Maine** have raised concerns through their federal consistency reviews of the LFA program. Hawaii's position is discussed above, California's review is still pending, and, while it initially concurred with the Navy's consistency determination (on March 14, 2000), the State of Maine recently sent a letter to the Navy raising new concerns over LFA offshore of its state. These concerns are based in part on potential impacts to the endangered northern right whale (letter, State of Maine to Navy, August 7, 2001). In this letter Maine requested a supplemental consistency determination[15] before any LFA operation off its state. The Navy's response letter (October 2,

[15] Pursuant to 15 CFR 930.46: Supplemental Coordination for proposed activities

2001) indicates it currently has no plans to operate in the Gulf of Maine, and that it will continue to coordinate with the State of Maine.

Finally, extensive amounts of geophysical surveys occur in the Gulf of Mexico, both in state and federal waters. In the State of Louisiana, these operations are not regulated by the state. Offshore of **Texas**, the State of Texas regulates surveys within state waters, but does not review surveys beyond the 3 mi. limit (which are regulated by NMFS and MMS). In federal waters, airguns are used. The State of Texas allows explosives within state waters. Texas' General Land Office (GLO) issues large numbers of seismic survey permits (Geophysical and Geochemical Exploration Permits). The state generally allows use of explosives in State waters (charges generally range from 2.5 to 10 pounds) in shallow waters (too shallow for airguns). Texas' guidelines for the permits include the following mitigation measures:

- No activities within 1000 ft. of known bird rookery island, Feb 15-Sept. 1.
- Any wildlife killed requires compensation.
- Biological monitors may be required.
- High velocity energy sources shall not be detonated within 0.5 mi. of operating shrimping fleet.
- High velocity energy sources shall not be detonated within 500 ft. of any oyster bed, artificial reef, or red snapper bank.
- Avoid impacts to submerged seagrass beds.
- Weekly biologic monitoring reports (and a final report) shall document wildlife effects; impacts to sensitive habitats including endangered species, waterbird nesting islands, seagrass beds, oyster reefs, vegetated marshes coastal barriers and dune systems, as well as commercial recreational fish and shellfish habitats, may require restoration.

[Note: This document was prepared by the staff of the CCC. Any opinions expressed represent the views of the author; this report was not adopted by, and does not represent, the views of the CCC.]

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